National Institute of Environmental Health Sciences

What effect will a few degrees of climate change have on human heat balance? Implications for human activity

Author(s): Maloney SK, Forbes CF
Year: 2011
Journal: International Journal of Biometeorology. 55 (2): 147-160

Abstract:

While many factors affecting human health that will alter with climate change are being discussed, there has been no discussion about how a warmer future will affect man's thermoregulation. Using historical climate data for an Australian city and projections for Australia's climate in 2070, we address the issue using heat balance modelling for humans engaged in various levels of activity from rest to manual labour. We first validate two heat balance models against empirical data and then use the models to predict the number of days at present and in 2070 that (1) sweating will be required to attain heat balance, (2) heat balance will not be possible and hyperthermia will develop, and (3) body temperature will increase by 2.5 degrees C in less than 2 h, which we term "dangerous days". The modelling is applied to people in an unacclimatised and an acclimatised state. The modelling shows that, for unacclimatised people, outdoor activity will not be possible on 33-45 days per year, compared to 4-6 days per year at present. For acclimatised people the situation is less dire but leisure activity like golf will be not be possible on 5-14 days per year compared to 1 day in 5 years at present, and manual labour will be dangerous to perform on 15-26 days per year compared to 1 day per year at present. It is obvious that climate change will have important consequences for leisure, economic activity, and health in Australia.

Source: http://dx.doi.org/10.1007/s00484-010-0320-6

Resource Description

Exposure :

weather or climate related pathway by which climate change affects health

Temperature

Temperature: Extreme Heat

Geographic Feature:

resource focuses on specific type of geography

Ocean/Coastal, Urban

Geographic Location:

resource focuses on specific location

Non-United States

Non-United States: Australasia

Health Impact: ☑

specification of health effect or disease related to climate change exposure

Injury, Other Health Impact

Other Health Impact: heat stress, heat-related illness

Mitigation/Adaptation: ☑

mitigation or adaptation strategy is a focus of resource

Adaptation

Model/Methodology: ☑

type of model used or methodology development is a focus of resource

Exposure Change Prediction, Outcome Change Prediction

Population of Concern: A focus of content

Population of Concern: ☑

populations at particular risk or vulnerability to climate change impacts

Workers

Resource Type: ☑

format or standard characteristic of resource

Research Article

Resilience: ☑

capacity of an individual, community, or institution to dynamically and effectively respond or adapt to shifting climate impact circumstances while continuing to function

A focus of content

Timescale: ☑

time period studied

Long-Term (>50 years)